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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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John M. Janway
3031 NW 64th Steet
Seattle, WA 98107

EXAMINER	
EIDE, HEIDI MARIE	

ART UNIT	PAPER NUMBER
3732	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/772,104	LEWALLEN ET AL.	
	Examiner	Art Unit	
	HEIDI M. EIDE	3732	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 January 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9,12-22,24,26-28,31-33,36 and 47-71* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9,12-22,24,26-28,31-33,36 and 47-71* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on January 29, 2009 has been entered.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-3, 5-7, 47-48, 58-65 and 67-71 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saito et al. 5,017,134 (Saito) in view of Masreliez 5,759,159 in view of Arai 4,243,388. Saito teaches an apparatus to determine the proximity of a dental instrument to a tooth's apical foramen while the instrument is in the tooth's canal, the apparatus comprising a handpiece 2 that includes a dental instrument 3 operable to remove tissue from a tooth of the patient, a handpiece driver coupled to the dental instrument and operable to drive the dental instrument to remove the tissue and an electrically conducive path that includes at least a portion of the coupling between the dental instrument and the handpiece driver (col. 5, ll. 50-55), a signal generator 11/12

coupleable to body tissue of a patient and to the handpiece, wherein while the signal generator is coupled to the body tissue and the instrument, the signal generator generates a voltage signal across the body tissue and the electrically conductive path (col. 5, ll. 35-42, ll. 50-55) and a processor 26 coupleable to the dental handpiece an that while coupled to the dental handpiece and while the instrument removes tissue from the patient's tooth, senses the voltage signal after the voltage signal has been modified by the impedance of the patient's body and compares the modified voltage signal to the voltage signal generated by the signal generator (col. 3, ll. 9-21, ll. 46-53). Saito further teaches the voltage signal includes an amplitude and a frequency and the processor compares the amplitude of the voltage signal generated by the signal generator to the amplitude of the modified voltage signal (col. 4, ll. 53-68, col. 5, ll. 1-4). Saito also teaches in response to comparing the modified voltage signal to the voltage signal generated by the signal generator, the processor generates a proximity signal that represents the proximity of the dental instrument to the tooth's apical foramen, wherein the proximity signal is generated from an equation that is stored in the apparatus and executed by the processor that correlates to at least one signal comparison with a proximity of the dental instrument to the apical foramen (col. 5, ll. 35-42, 50-55). Saito teaches wherein the voltage signal consists essentially of a singe frequency (col. 3, ll. 9-13) and wherein sensing the modified voltage signal includes amplifying the modified voltage signal (col. 3, ll. 14-15). Saito also teaches wherein indicating the proximity of the dental instrument of the apical foramen includes updating the proximity signal (col. 5, ll. 56-65). As to claims 47 and 69 Saito does not specifically

teach the proximity signal is generated from a look-up table, however, it would have been obvious to one having ordinary skill in the art at the time of the invention to use a look-up table in lieu of an arithmetic equation as values on the table would be defined by the equation. Saito does not teach the processor demodulates the modified voltage signal to isolate the modified voltage signal from the electrical noise generated by the dental instrument, an analog to digital converter that digitizes the modified voltage signal, the processor determines the phase of the modified voltage signal relative to the voltage signal generated by the signal generator and comparing the modified voltage signal and the phase signal includes comparing their amplitudes and phase. Masreliez teaches a microprocessor which demodulates a signal to isolate the signal from the electrical noise generated by an instrument (col. 3, ll. 15-18, col. 4, ll. 45-46). Masreliez further teaches an analog to digital converter 70 and further teaches comparing the amplitudes and/or phases of the signal (see abstract, col. 2, ll. 13-24). It would have been obvious to one having ordinary skill in the art at the time of the invention to modify Saito in view of Masreliez in order to improve the accuracy of the measurement as taught by Masreliez (col. 2, ll. 20-23). Saito in view of Masreliez teach the invention as discussed above, however does not specifically teach the handpiece driver is mechanically coupled to the dental instrument. Arai teaches the handpiece driver is mechanically coupled to the dental instrument (fig. 1, col. 2, ll. 41-46). It would have been obvious to one having ordinary skill in the art at the time of the invention to modify Saito in view of Masreliez further in view of Arai as a matter of obvious design choice is

the applicant teaches in par. 45 of the originally filed specification that the handpiece used is a traditional dental handpiece.

3. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Saito et al. 5,017,134 (Saito) in view of Masreliez 5,759,159 in view of Arai 4,243,388 as applied to claim 1 above, and further in view of Reifman et al. 6,425,875 (Reifman). Saito in view of Masreliez teach the invention as discussed above, however, does not teach the apparatus further comprising a reference impedance coupled to the signal generator and the handpiece such that the reference impedance and the handpiece are arranged in series relative to each other, and the signal generator generates a voltage signal across the combination of the reference impedance, the handpiece and the body tissue, wherein the reference impedance is known. Reifman teaches a reference impedance coupled to the signal generator and the dental instrument such that the reference impedance and the dental instrument are arranged in series relative to each other, and the signal generator generates a voltage signal across the combination of reference impedance, the dental instrument and the body tissue, wherein the reference impedance is known (col. 6, ll. 1-22). It would have been obvious to one having ordinary skill in the art at the time of the invention to modify Saito in view of Masreliez in view of Arai further in view of Reifman in order to have a known and controlled variable in computing the proximity.

4. Claims 49-52 and 66 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saito et al. 5,017,134 (Saito) in view of Masreliez 5,759,159 in view of Arai 4,243,388 as applied to claim 1 above, and further in view of Silver el al. 6,356,350 (Silver). Saito in view of Masreliez in view of Arai does not teach the processor executes a synchronous demodulation algorithm, a fast Fourier transform, a single frequency fast Fourier transform or a convolving algorithm to demodulate the modified voltage signal from electrical noise generated by the dental instrument. Silver teaches using a fast Fourier transform to demodulate a signal (col. 5, ll. 60-62). Applicant does not claim criticality as to the different methods of demodulating the signal; therefore it would have been an obvious matter of design choice to use any known mathematical method to demodulate the signal in order to obtain the most accurate result.

5. Claims 8-9, 12-14, 16, 18-22, 24, 26-28, 31-33, 36, 53-54 and 56-57 rejected under 35 U.S.C. 103(a) as being unpatentable over Reifman et al. 6,425,875 (Reifman) in view of Arai 4,243,388 in view of Masreliez 5,759,159. Reifman teaches an apparatus to indicate the proximity of a dental instrument to a tooth's foramen while the instrument is in the tooth's root canal the apparatus comprising a first lead operable to couple the apparatus to a handpiece 5 and including a second node, a second lead operable to couple the apparatus to body tissue of a patient and including a third node, wherein the body tissue has an impedance, a known reference impedance 21 coupled to the first lead such that while the first lead is coupled to the handpiece and the second lead is coupled to the body tissue, the reference impedance, handpiece and body tissue

are arranged in series relative to each other, a signal generator 3 coupled to the reference impedance and the second lead, wherein the coupling between the signal generator and the reference impedance includes a first node, the signal generator operable to generate a divider signal across the combination of the reference impedance, handpiece and body tissue and wherein the reference impedance is operable to modify the divider signal (col. 6, ll. 1-13). Reifman further teaches microprocessor 2 that includes a storage (col. 5, ll. 6-11) and the microprocessor samples a stimulation signal that includes the divider signal modified by the reference impedance and the body tissue's impedance and compares the stimulation signal to the divider signal (col. 5, ll. 31-39, col. 6, ll. 1-14), stores at least one lookup table that correlates at least one signal comparison with a proximity of the dental instrument to the apical foramen (col. 5, ll. 6-11) and generates a proximity signal from the lookup table and a proximity indicator that indicates the proximity of the dental instrument to the tooth's apical foramen (col. 6, ll. 10-22). Reifman further teaches the divider signal includes an amplitude and a frequency (col. 5, ll. 22-39), the reference impedance essentially consists of a resistive element and the reference impedance comprises a resistive and reactive element (col. 6, ll. 1-10) and the apparatus further including a signal conditioner wherein the signal conditioner includes an amplifier 7 coupled between the second node and the processor that amplifies the stimulation signal (col. 5, ll. 34-39). Reifman teaches the lookup table includes an empirical element derived from observation of the divider signal and the stimulation signal as a function of proximity of the dental instrument to the apical foramen in teeth other than teeth of the patient (col.

2, ll. 17-29, col. 5, ll. 6-11). Reifman also teaches the proximity indicator includes a digital display (col. 7, ll. 24-26) that displays digits representing a relative proximity to the apical foramen as illustrated in fig. 3 and wherein the processor updates the proximity signal (col. 7, ll. 61-67) and the proximity indicator includes a haptic device 11. Reifman does not specifically teach the display displays digits representing a distance to the apical foramen in a unit of measure, however, does teach a numerical display (col. 2, ll. 51-55), therefore it would have been obvious to one having ordinary skill in the art to include a unit of measure to correspond to the numerical display to produce useable results. Reifman teaches the divider signal consists essentially of a single frequency (col. 6, ll. 1-2) and wherein generating a proximity signal includes executing an equation that correlates at least one signal comparison with a proximity of the dental instrument to the apical foramen col. 2, ll. 22-27). Reifman does not teach a handpiece that includes a dental instrument operable to remove tissue form a tooth of the patient, a handpiece driver mechanically coupled to the dental instrument and operable to drive the dental instrument to remove tissue and an electrically conductive path that includes at least a portion of the mechanical coupling between the dental instrument and the handpiece driver and the microprocessor demodulates the modified voltage signal to isolate the modified voltage signal from the electrical noise received via the electrically conductive path between the dental instrument and the handpiece driver. Arai teaches a handpiece 3 that includes a dental instrument 7 operable to remove tissue form a tooth of the patient, a handpiece driver mechanically coupled to the dental instrument (fig. 1) and operable to drive the dental instrument to remove tissue and an electrically

conductive path that includes at least a portion of the mechanical coupling between the dental instrument and the handpiece driver (col. 2, ll. 34-46). It would have been obvious to one having ordinary skill in the art at the time of the invention to modify Reifman in view of Arai in order to remove and widen the root canal and to stop the engine one the desired depth has been reached in order to prevent deepening the root canal too much. Masreliez further teaches a processor which demodulates a signal to isolate the signal from the electrical noise generated by an instrument and handpiece (col. 4, ll. 45-46). It would have been obvious to one having ordinary skill in the art at the time of the invention to modify Reifman in view of Arai further in view of Masreliez in order to obtain the most accurate result.

6. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Reifman et al. 6,425,875 (Reifman) in view of Arai 4,243,388 in view of Masreliez 5,759,159 as applied to claim 8 above, and further in view of Farin et al. 5,267,997 (Farin). Reifman in view of Arai in view of Masreliez does not teach the use of a low pass filter. Farin teaches the use of a low pass filter (col. 6, ll. 22-28). It would have been obvious to one having ordinary skill in the art at the time of the invention to modify Reifman in view of Arai in view of Masreliez further in view of Farin in order to filter out unwanted noise as taught by Farin (col. 6, ll. 22-28).

7. Claims 17 and 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Reifman et al. 6,425,875 (Reifman) in view of Arai 4,243,388 in view of Masreliez

5,759,159 as applied to claims 8 and 27 above, and further in view of Silver el al. 6,356,350 (Silver). Reifman in view of Arai in view of Wilson does not teach the microprocessor performs at least one of the following: a synchronous demodulation algorithm, a fast Fourier transform, a single frequency fast Fourier transform or a convolving algorithm to demodulate the modified voltage signal from electrical noise received via the electrically conductive path between the dental instrument and the handpiece driver. Silver teaches using a fast Fourier transform to demodulate a signal (col. 5, ll. 60-62). It would have been an obvious matter of design choice to use any known mathematical method to demodulate the signal in order to obtain the most accurate result.

Response to Arguments

8. Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

\Any inquiry concerning this communication or earlier communications from the examiner should be directed to HEIDI M. EIDE whose telephone number is (571)270-3081. The examiner can normally be reached on Mon-Thurs.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cris Rodriguez can be reached on 571-272-4964. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Heidi Eide
Examiner
Art Unit 3732

/John J Wilson/
Primary Examiner
Art Unit 3732

/Heidi M Eide/
Examiner, Art Unit 3732

4/21/2009